Options for a Top-up Sample to the HILDA Survey

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1. Introduction

As the Household, Income and Labour Dynamics in Australia (HILDA) Survey ages and becomes established as a panel, its long-term viability needs to be planned for. One area of concern is that immigrants arriving after the original sample was selected are not adequately represented in the HILDA Survey sample, and cannot be, without a top-up to the sample.

The under-coverage of the Australian population originates from the HILDA Survey sample design and following rules. The sample was selected in 2001 from people living in private dwellings in non-remote parts of Australia. The people from wave 1 responding households are followed over time and interviewed. Other people they subsequently live with are also interviewed, but not followed. The exception to this rule is that when children are born to or adopted by sample members – they become part of the sample followed over time (along with their other parent if they are not already part of the permanent sample). The HILDA Survey sample, if left untouched, will not adequately represent the following groups of people:

- Immigrants permanently settling in Australia since 2001;
- Long-term overseas visitors arriving in Australia since 2001;
- Australians returning from overseas that were not in Australia in 2001;
- People who lived in a non-private in 2001 (such as staff quarters, prisons, etc);
- People who lived in remote parts of Australia in 2001; and
- Australian-born children of people in the above five groups.

To retain contemporary cross-sectional representativeness there is clearly a need for the HILDA Survey sample to be extended at some future date to include people from at least the largest of these groups with characteristics dissimilar to those already in the survey. For the reasons outlined later in this paper, recent permanent arrivals and their children are the primary focus of the discussion of the top-up sample.

Similar indefinite life studies around the world also face a loss of cross-sectional population coverage over time and have responded in a number of ways. The longest running household panel

study, the US-based Panel Study of Income Dynamics (PSID), did not attempt to address this issue for many years. The first top-up sample attempt, occurring 22 years after the study began, only included immigrants from three major countries and, because of this deficiency and a lack of funding, this sample was dropped after six years.[1] The second, more successful, top-up to the PSID sample occurred 29 years after the study began and, while it was smaller, it did represent all post-1968 immigrant households. The German Socio-Economic Panel (GSOEP) has had a number of additions to its sample since it began in 1984 (Haisken-DeNew and Frick, 2003). A specific top-up of immigrants who arrived in Germany after the original sample was selected occurred 10 years after the study began. General top-up samples (which select households from across the population) have been added to the original GSOEP sample three times to date and have occurred at irregular intervals. These general top-up samples would have included people who gained German citizenship since 1984. Eight years after the British Household Panel Study (BHPS) began, a general top-up sample was added to the Scottish and Welsh samples (Taylor *et al*., 2006), which would have included any immigrants to those areas since the original sample was selected. No other top-up of the BHPS sample has occurred and this deficiency has been acknowledged by BHPS team (Lynn, 2003).

This paper discusses the extent of the under-coverage in the HILDA Survey sample (in section 2); the design options for extending the sample (in section 3); and the findings from some testing undertaken in the first half of 2006 (in section 4).

2. Extent of population under-coverage

To build a picture of the size and shape of the population excluded from the HILDA Survey sample, three factors are considered: the number of missing people; how long they are likely to be in Australia; and their characteristics. If the number is not significant, they do not stay in Australia for long, or their characteristics are similar to those already in the HILDA Survey, then there would be limited benefit in explicitly including these people in the sample.

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[1] See *An Overview of the Panel Study of Income Dynamics*, http://psidonline.isr.umich.edu/Guide/Overview.html.

Table 1: Estimated size of omitted population from HILDA Survey after sample selection in 2001

	Permanent arrivals[a]	Long-term overseas visitors[b]	Returning Australian residents[c]	Non-private dwelling residents[d]	Remote Australia residents[e]	Total
After 5 years						
Omitted population	490,000	300,000	200,000	50,000	25,000	1,065,000
Percent of Australian population[f]	2.4%	1.5%	1.0%	0.2%	0.1%	5.1%
After 10 years						
Omitted population	950,000	300,000	200,000	50,000	40,000	1,540,000
Percent of Australian population[f]	4.4%	1.4%	0.9%	0.2%	0.2%	7.0%
After 15 years						
Omitted population	1,410,000	300,000	200,000	50,000	40,000	2,000,000
Percent of Australian population[f]	6.2%	1.3%	0.9%	0.2%	0.2%	8.7%

Notes: a Actual number of permanent arrivals used for 2002 to 2004 and assumed to be 100,000 from 2005 onwards. Assumes emigration rates as observed in the Longitudinal Survey of Immigrants to Australia between 1993 and 1995: 5 per cent leave after 3 years and a further 3 per cent expect to leave several years after that (VandenHeuvel and Wooden, 1999, p 112).

   b Actual number of long-term visitors used for 2002 to 2004 and assumed to be 200,000 from 2005 onwards. Hugo (2004) reports there were 626,266 immigrants who arrived in Australia in the five years prior to the 2001 Census. If we assume the above emigration rates for permanent arrivals and that two-thirds of the long-term overseas visitors leave each successive year, we obtain an estimated stock of immigrants arriving in the 1997-2001 period equal to that observed in the 2001 Census (two thirds being permanent arrivals and one third being long-term overseas visitors).

   c Actual number of returning Australians used for 2002 to 2004 and assumed to be 100,000 from 2005 onwards. Assumes 82 per cent of departing Australians are away for 2 years (ABS Cat. No. 3412.0, 2002-03, p49), 97 per cent are away for 3 years and 99 per cent are away for 4 or more years. A retention rate of 99 per cent of returning Australians has been applied. Only those returning after 2001 that are estimated to have been away in 2001 are included here.

   d Estimated number of people in remote Australia in 2001 is 80,000 (Watson and Wooden, 2002). Assumes migration out of remote areas is of similar size to migration into remote areas (being 16,000 people in three years based on the HILDA Survey sample or 7 per cent each year). Only estimate the number now living in non-remote areas and cap at 40,000.

   e In 2001, there were 331,000 people living in non-private dwellings in Australia and half were aged 65 or over (ABS Cat.No. 1301.0, 2006, p144). Perhaps 50,000 now live in private dwellings (being mainly those who were living in staff quarters, religious institutions, prisons, and people not attached to families living in boarding schools, colleges and university residences).

   f Series B of population projects were used (ABS Cat. No. 3222.0, November 2005).

An estimate of the number of people excluded from the HILDA Survey sample because they were overseas, living in non-private dwellings or living in remote Australia in 2001 is provided in Table 1. This table combines information on how many people are in the omitted population together with how long they will be in Australia. The portion of the Australian population omitted from the HILDA Survey sample will grow from an estimated 5.1 per cent after five years to 8.7 per cent after 15 years. The size of this omitted group is considerable and growing, with the growth primarily driven by the permanent arrivals.

Recent permanent arrivals are essential to any top-up, not only because of the size of this group but also because they have characteristics that are markedly different from the Australian

population. Hugo (2004) undertook a comparative analysis of the immigrants arriving in the five years prior to the 2001 Census (which includes permanent arrivals and long-term overseas visitors) with both the long-standing immigrants and the Australian born population, concluding that international migration is one of the major sources of social change in the 1996-2001 intercensal period. A number of key findings about the characteristics of recent immigrants are summarized below:

- The single largest origin of permanent arrivals to Australia is New Zealand, with 24.1 per cent of all permanent arrivals being New Zealand citizens (26.0 per cent of these were born outside of New Zealand).

- There has been a shift in immigrant origins over time.[2]

- Migrants tend to settle in large urban areas – 89.1 per cent are in major urban areas, 7.8 per cent in other urban areas, and 3.1 per cent in rural areas.[3]

- Recent immigrants have a higher rate of unemployment, lower rate of labour force participation, and higher levels of education than the Australian-born and long-standing migrants. Recent immigrants are more likely to go into either managerial/professional occupations or become labourers and related workers.

- A higher proportion of recent immigrants are married, have on average a younger age at first marriage, and a lower proportion are divorced or separated than the Australian-born and long-standing migrants.

- A recent shift of incorporating the English ability of the applicant into the immigration process has resulted in fewer immigrants being unable to speak English.[4]

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[2] Over a third of all people arriving from the following origins did so between 1996 and 2001: Indonesia, Iraq, Bosnia and Herzegovina, Japan, Korea, Taiwan, South Africa, Singapore and Thailand.

[3] This can be compared to the distribution of the Australian-born population where 59.9 per cent live in major urban areas, 25.3 per cent in other urban areas, and 14.8 per cent in rural areas.

[4] In 2001, 14.8 per cent of the recent immigrants could not speak English well or at all, compared to 21.1 per cent of the recent immigrants in 1996.

- Recent immigrants are more likely to be renting (60.9 per cent compared to 24.8 per cent for the Australian-born population). They also pay higher rents and have larger mortgages than the Australian-born population.

Without the addition of recent permanent arrivals, the HILDA Survey sample will drift away from the true characteristics of the Australian population and will only be representative of a smaller portion of the population over time.

Long-term overseas visitors (being those that stay in Australia for 12 months or more, but do not intend to stay permanently) are a medium sized group and are unlikely to stay in Australia for longer than a few years. They will not have any bearing on long-run longitudinal analyses, but will have a small impact on the short-run longitudinal and cross-sectional analyses due to the differences in characteristics noted above. Without a frequent top-up of these types of people (which would be costly for limited gain), the sample would fairly quickly lose representation of these people over time. It would be desirable, but not essential, to include these people in the top-up to ensure category jumpers were included (i.e., those who initially thought they would be visiting for a couple of years but ended up staying permanently).

The impact of not including returning Australians who were away in 2001 into the HILDA Survey sample is relatively small because of both the size of this group and that they are likely to be similar to other Australians who lived overseas at a different time but who were selected into the sample in 2001.[5] Their inclusion in the top-up is not essential, but is desirable if it does not add much to the cost.

People living in remote parts of Australia who now live in non-remote parts are not essential or desirable for the top-up. They are very few in number and would be hard to accurately identify.

People who were living in non-private dwellings in 2001 were excluded from the original sample because of the costs and difficulties involved in selecting and interviewing them. Including these people into the top-up sample would also be difficult and costly. For those that are still living

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[5] Emigration from Australia is selective to the more highly educated, more skilled and younger sections of the population (Hugo, Rudd and Harris, 2001). Australians that return from overseas would have similar characteristics.

in non-private dwellings, the same selection and interviewing difficulties remain. A small portion of those who used to live in non-private dwellings in 2001 would now live in private dwellings, but determining when and how long they were in a non-private dwelling in 2001 via a screening process would be problematic. Their move into and out of a non-private dwelling may not be clear cut and some may also be reluctant to disclose details of their stay. As a result, their inclusion in the top-up sample is not essential, even though it may be desirable.

Given the above, the top-up should, at a minimum, include permanent arrivals and, if possible, include long-term overseas visitors and returning Australians (these three groups are collectively termed 'recent arrivals' for the purposes of this paper). The children of these people who are still living with their parents will be automatically included due to the household nature of the HILDA Survey. Depending on how long after 2001 the top-up sample is conducted, some thought should also be given to whether children born to this population after 2001 who no longer live with their parents/guardians should be identified and interviewed.

3.   Top-up sample options

There are two main ways of correcting the population under-coverage in the HILDA Survey sample: i) select a sample that adds people only from this specific population group; or ii) select a general sample from across the entire population that includes this specific population group. The first strategy directly and exclusively addresses the under-coverage problem. The second strategy, however, provides a courser correction to the under-coverage problem, but simultaneously also increases the sample size for analyses and reduces the non-response bias in estimates. With this in mind, there are various frame, sampling, frequency and fieldwork options to be considered for a top-up to the HILDA Survey sample.

3.1   Frame options

There are two main types of frames from which a top-up sample could be taken: an area-based frame or a list-based frame.[6]

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[6] A 'frame' is a list of units (such as households or people) in the population from which a sample is drawn.

The frame closest to that used in the original HILDA Survey sample design is an area-based frame which provides a list of the geographical areas in Australia. Once areas are selected, the dwellings in each area are listed and a sample is selected for screening or interviewing. The area-based frame provides the best coverage of the omitted population. If a recent arrival top-up were undertaken, a large screening exercise would be needed to identify those in-scope and this is costly.

There are two main options for an area-based frame: use the areas already selected; or select new areas. Using areas already selected would seek to minimize interviewer travel time between existing and new areas. Several 'neighbours' of the existing areas could be considered but the two most likely choices are dwellings that are next to or near those households currently responding, or dwellings in a neighbouring Census Collection District (CD) to those originally selected in 2001. Alternatively, new CDs could be selected from the list used in the 2006 or 2011 Census, excluding those in remote Australia. Selecting new areas would ensure the new estates have an equal chance of selection and avoids highly clustering the top-up sample with the new sample, but it increases travel costs.

The alternative to an area-based frame is a list-based frame, where the individuals or households available for selection are listed. The three main questions to be asked about a list-based frame are: i) Does the list contain all units in the population that we wish to sample? ii) Does the list contain many units that we do not wish to sample? iii) Are the contact details of the units on the frame up-to-date? Six different list options are briefly considered below (for more details, see Watson (2006)). The first option could be used to identify recent arrivals or undertake a general top-up, whereas the last five options focus on identifying recent arrivals. The list-based options are:

- Random digit dialing – This method generates a list of all possible telephone numbers based on a list of telephone prefixes known to be in use. Silent numbers are included, but so are 'dead' numbers.[7] Households that do not have a land-line are excluded.[8] Response

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[7] Bennett and Steel (2000) found that 54 per cent of their numbers for their Queensland random digit dialing sample were disconnected numbers, fax numbers, or numbers for non-private dwellings.

rates to telephone surveys are typically six percentage points below those of face-to-face surveys (de Leeuw and van der Zouwen, 1988). Households may also be reluctant to provide their address over the phone for future interviews. However, telephone interviews offer greater flexibility over face-to-face interviews with respect to the use of interpreters and provide a cheaper alternative to face-to-face interviewing.

- Department of Immigration and Multicultural Affairs (DIMA) Settlement Database – DIMA maintains a settlement database which lists permanent visaed immigrants in Australia, including both off-shore and on-shore applications. The list excludes New Zealanders, long-term overseas visitors to Australia and returning Australians. It would include some people who were resident in Australia in 2001 and some recent immigrants who have subsequently left Australia (but not many). The address details have a limited lifespan. This list was used for the Longitudinal Survey of Immigrants to Australia which found 16 to 18 per cent of the sample could not be traced prior to the first interview (DIMIA, 2002).

- Health Insurance Commission Medicare Enrolment Database – To gain access to health care in Australia, immigrants need to apply for a Medicare card. The address details are more likely to be correct over a longer term than the DIMA Settlement Database. The significant drawback of the Medicare Enrolment Database is that it could only be used for an *opt-in* process.

- Department of Families, Community Services and Indigenous Affairs (FaCSIA) Customer Database – FaCSIA maintains a database of customers receiving benefit payments along with basic demographic information such as the year of arrival to Australia. However, the number of immigrants receiving benefits and the number arriving in Australia demonstrates a strong divergence from 1997 onwards, indicating a significant

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[8] As of 1996, 2.5 per cent of Australian households were without a home phone (ABS Cat. No. 4103.0, September 1996). It is likely this number may have increase to around 6 per cent recently with some households using mobile phones instead.

under-coverage in the frame in more recent years for the purposes of identifying recent immigrants.

- Multiplicity or snowball sampling – The basic premise behind these methods is to use a small set of cases from the population from which other members of the population are found in either reasonably well defined ways (multiplicity sampling) or undefined ways (snowball sampling). Neither of these methods will work for immigrants who are not well connected with each other. In addition, it is difficult to obtain accurate information to weight cases identified via multiplicity sampling and it is impossible to weight cases identified via snowball sampling (Kalton and Anderson, 1986).

- Airport arrival gate sampling – The list of all flights arriving in Australia each year from overseas destinations could be used as a frame to select a sample of flights for which a sample of passengers are approached. There are many other travelers on the flights besides permanent arrivals, long-term overseas visitors and returning Australians so screening will still be a major undertaking. Also, the selection of passengers to be approached will occur in a highly uncontrolled environment which could lead to some significant biases.

3.2   Sampling

Once the population frame has been decided, there are a number of ways to actually take a sample of units from the frame. The issues of clustering, over-sampling particular areas, the proposed sample size, sample integration, and the following rules are discussed below.

3.2.1   Clustering and over-sampling

To ensure face-to-face interviewing costs are not prohibitive, the sample should be clustered into areas. Even if the screening or first wave interviews were conducted by telephone, it would be preferable to reallocate these households to a face-to-face interviewer as soon as possible. The additional personal contact that a face-to-face interviewer has with the household is important for building the relationship with the respondent which in turn boosts response rates. We may also want

to cluster the new sample with the existing sample, particularly in small rural towns and other rural areas to avoid unnecessarily high fieldwork costs.

It has been noted earlier in this paper that immigrants tend to be clustered in certain areas (that is, they settle in areas where other immigrants are). This fact could be used to help target the screening process in a recent arrival top-up or to add extra sample in a general top-up (either face-to-face or by telephone) in areas where there is known to be a large proportion of immigrants. Kalton and Anderson (1986) warn that if the distribution of the immigrants has changed markedly between the time the Census was conducted and when the sample is drawn then a serious bias can result. Returning Australians would not be concentrated in areas in a similar manner as immigrants.

3.2.2 Sample size

Ideally, a recent arrival top-up sample should have a similar sampling fraction as the original sample. The contribution the recent arrivals make to the cross-sectional estimates will then be similar to those people from the original sample. The longer we wait to undertake a top-up, the larger the number of recent arrivals we will want to include. However, should there be interest in analysing sub-groups of the omitted population, the sample sizes would need to be increased appropriately.

If a general top-up were undertaken, the sample size would largely be determined by other considerations (such as the funding potential, sample size concerns in certain policy groups, and the extent of non-response bias believed to be in the estimates). The number of recent arrivals in the general top-up would be relatively small.

3.2.3 Sample integration and following rules

The current HILDA Survey sample and the top-up sample will need to be combined to provide a coherent cross-section and longitudinal sample of the Australian population from the wave the top-up sample is introduced.

Under the current HILDA Survey following rules, a permanent arrival, long-term overseas visitor or returning Australian who share a household with a permanent sample member are

interviewed for as long as they live with this permanent sample member and then dropped from the sample. We are contemplating modifying these following rules to keep any permanent arrival or long-term overseas visitor as a permanent sample member to reduce the population coverage bias until a top-up sample is introduced.[9] If a recent arrival top-up were undertaken, we intend to only treat the permanent arrivals, long-term overseas visitors or returning Australians in the top-up sample as permanent sample members which are followed over time (making adjustments to the weights for people we have retained in the ongoing sample from this group prior to the top-up occurring). If a general sample extension were introduced, then all members of the households in this sample would be considered permanent sample members and the cross-sectional weights of those who could have been selected in both the original sample and the extension would need to be modified.

3.3   *Frequency of sampling*

In determining the frequency of the top-up sample, it is worth contemplating what the top up will mean for those using the data. A large top-up sample might be undertaken every 10 to 15 years via face-to-face or telephone screening. In contrast, the sample might be topped-up every year by sampling the permanent arrivals within the last year from the DIMA Settlement Database (which would exclude New Zealanders and returning Australians). Another option, is to have one large top-up around wave 10 to 15 followed by annual sampling thereafter.

Figure 1 shows which analyses could incorporate the top-up sample if a large top-up sample were added in wave *n*. Figure 2 shows how the data could be used with annual top-up samples. The analyses that could incorporate the top-up sample are shown in black, while those that could not include the top-up sample are shown in gray.

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[9] As of Wave 4, 51 recent immigrants had joined a HILDA household (representing about 14 per cent of the omitted population). Seven of these people have been dropped from the sample under the current following rules.

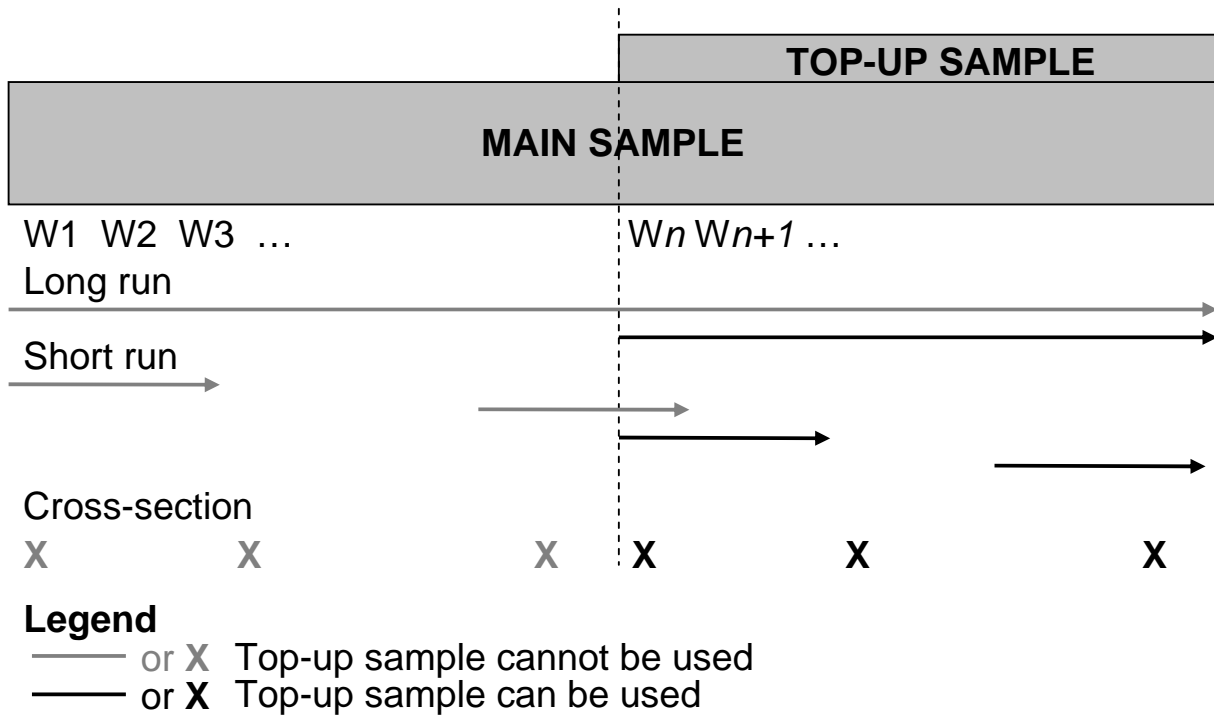**Figure 1: Incorporation of the infrequent top-up sample into analyses**

TOP-UP SAMPLE

MAIN SAMPLE

W1 W2 W3 …   Wn W$n+1$ …
Long run

Short run

Cross-section
X   X   X   X   X   X

Legend
——— or X Top-up sample cannot be used
——— or X Top-up sample can be used

Figure 2: Incorporation of the frequent top-up samples into analyses

TOP-UP SAMPLES

MAIN SAMPLE

W1 W2 W3 …   Wn W$n+1$ …
Long run

Short run

Cross-section
X   X   X   X   X   X

Legend
——— or X Top-up sample cannot be used
——— or X Top-up sample can be used
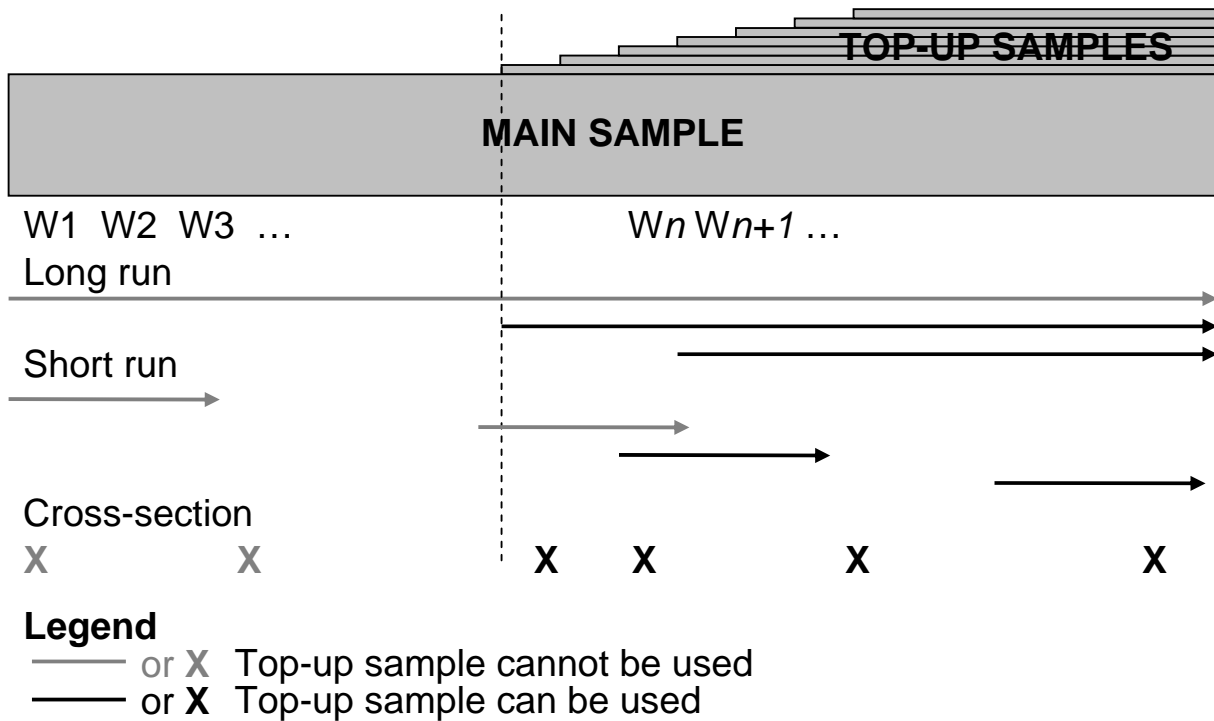
Researchers interested in long-run analyses will gain no benefit from the top-up sample until their window of research starts on or after the wave the top-up is introduced, which may not be for quite some time after its introduction. Such researchers would want the top-up sample to be as comprehensive as possible and as large as possible. The annual top-ups would be inferior to the large infrequent top-up as it offers lower coverage of the missing population and would have a higher cumulative attrition rate.

For researchers undertaking short-run analyses, they will be able to incorporate the top-up sample into their analysis as soon as their window of research starts on or after the top-up occurs. They would want the top-up to occur more frequently than the long-run analysts, though not necessarily annually. They would also want the top-up to have a good coverage but may not need it to be comprehensive. They would be content with either annual sampling or infrequent sampling.

The cross-sectional analysts will gain the most in the shortest time from the top-up sample. Their preference would be for the top-up to be done annually with adequate coverage of the key groups. While they would enjoy the better coverage of the infrequent top-up in the wave it was done and the few waves after that, their sample would again gradually drift from the Australian population with time.

The HILDA Survey has been set up as an indefinite life panel to permit long-run analyses. If researchers were only interested in short-run analyses, then the panel would have been best constructed as a rotating panel. The top-up strategy that fits the best with both long run and short run analyses is a large infrequent top-up sample.

3.4 Fieldwork considerations

To ensure high response rates are obtained in the top-up sample, there are a number of fieldwork strategies that can be employed. These strategies seek to engage the selected households with the survey so they can see the relevance of their involvement and are confident in the survey process. These strategies might include:

- getting support agencies of the population on board with the survey (for example, by obtaining a letter of support to show respondents);

- providing screened or selected households with advance notification of the survey and its objectives;

- conducting the interviews face-to-face rather than by telephone if possible;

- using interpreters (either a professional interpreter or a friend/family member of the respondent);

- translating respondent letters or showcards into the most common six or so languages;

- ensuring the interviewers are highly motivated to the task (particularly where screening with a very low hit rate might be involved); and

- ensuring any overlap of fieldwork for the top-up sample and the continuing sample is not detrimental to the response rates in either sample.

The household response rates that can be expected from a recent arrival top-up sample will be lower than a general sample of the entire population. In the first wave of the HILDA Survey, the household response rate was 66 per cent (Watson and Wooden, 2002a) and people born in a non-English speaking country were underrepresented in the respondents (Watson and Wooden, 2002b).[10] Using face-to-face interviewing, we expect to achieve a household response rate of around 60 per cent from a sample of recent arrivals. However, if telephone screening and interviewing were adopted instead, the expected household response rates would fall to around 55 per cent. Further, if telephone screening were followed by face-to-face interviewing, the response rates would fall further to around 50 per cent (as some people would initially agree to an interview, but then change their mind or not be available when the face-to-face interviewer visits). For a general top-up conducted face-to-face, we expect response rates similar to those achieved in wave 1, and if it was conducted by telephone, the response rates would be around 60 per cent.

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[10] Note, however, it has been demonstrated in the context of a Statistics Netherlands survey that nearly 90 per cent of the difference in response rates for immigrants and non-immigrants is a result of the social, economic, location and age variables of the ethnic population rather than ethnicity as such (Feskens et al, 2004).

3.5   Best methods

The two most promising top-up options are the near neighbour method and the general sample extension. The near neighbour method offers the highest expected response rates and coverage of the recent arrival population for a reasonable cost. A general sample extension will provide a greater increase to the overall sample size, adding sample from all sectors of the population, and will help reduce non-response bias.

Field testing of these two methods was undertaken in the Dress Rehearsal (pre-wave testing) associated with waves 5 and 6. The near neighbour method was tested in the wave 6 Dress Rehearsal and is discussed in the next section. The Dress Rehearsal sample size was increased in wave 5, thus providing a field test for the general sample top-up.[11] This wave 5 testing demonstrated that it is relatively straight forward to implement a general sample top-up. The main issue identified was that the response rates need to be monitored and managed separately from the continuing sample at every stage of the fieldwork to ensure high rates are obtained.

For the other methods discussed in this section, there are concerns about the expected response rates or frame coverage. Random digit dialing would achieve much lower response rates than face-to-face screening or interviewing. The DIMA database excludes New Zealand citizens (who form about a quarter of the omitted population) and has address details with a limited life. The DIMIA database could only be used for annual sampling and could not be used to correct for the population under-coverage that has occurred in the sample more than a year ago.

4.   Recent Arrival Dress Rehearsal

The near neighbour method was tested in New South Wales and Victoria by ACNielsen between February and May 2006 in conjunction with the fieldwork for the continuing Dress Rehearsal sample. The Dress Rehearsal was used to test the procedures and determine better ways to approach, screen and interview the sample. This section describes the procedures and the findings of this test.

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[11] An additional 519 responding households were added to the existing sample of 180 responding households.

A 'recent arrival', for the purposes of this test, was defined as a person who was living overseas during 1997 (that is, 9 years prior to when the test was conducted).[12]

4.1   Sample selection

The current addresses of the existing Wave 6 Dress Rehearsal sample were used as the starting point for selecting the near neighbour for the recent arrival sample, rather than their original addresses.[13]

The recent arrival sample was doubled in the metropolitan areas and halved in the rural areas to test the more complex selection procedure with the interviewers. That is:

- In the metropolitan areas, the second and fourth dwellings along from the current addresses were screened.

- In the non-metropolitan urban areas, the third dwelling along from every second current address was screened.

- In rural areas, the next dwelling along from every second current address was screened.

In practice, it would have been better to select a neighbouring CD from which to obtain the top-up sample. This approach avoids highly clustering the new sample within the existing sample, but still keeps the travel costs low. It also avoids complicated selection instructions for interviewers to select dwellings between addresses of the existing sample.

4.2   Screening

The interviewers approached each of these dwellings to undertake a short screening questionnaire face-to-face with a responsible adult. The questions are provided in figure 3 below.

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[12] If we introduce a recent arrival sample into the HILDA Survey sample, the earliest we would do so is in wave 10 (which is 9 years after the original selection of the sample in 2001).

[13] The original and current addresses would have been the same for 85 to 90 per cent of the sample due to the large sample extension added in wave 5.

Figure 3: Questions used to screen households for recent immigrants and returning Australians

S1	How many people, including yourself and children, usually live in your household?
	Enter number of people... ☐
S2	Have [you/ any members of this household] ever lived outside Australia for <u>more than 6 months</u>?
	Yes- single person household (S1=1) ....1 ➔S5
	Yes- multi person household (S1 is 2 or more)........2
	No ....3 ➔S8 (Code 2)
S3	How many of these household members have lived overseas for <u>more than 6 months</u>?
	Enter number lived overseas for more than 6 months .... ☐
S4	And how many of these people were born before 1997?
	Enter number born before 1997 .... ☐

S5	S6
Are you one of those people?	Did [you/*name from S5*] <u>live</u> in Australia at any time in 1997?
What is your first name?	Yes……………..1
What are the first names of all the (other) household members (born before1997) who have lived overseas?	No……….……....2
	If person only had a short term visit to Australia in 1997, record code 2

S8 Outcome of screening

Screened and in-scope (<u>any</u> code 2 at S6)...1

Screened and all household members out of scope (S2=3 <u>or</u> all code 1 at S6).................2

Not screened (non response)..3

While the screener had a very low level of error,[14] the screening questions did not flow particularly well. The interviewers found that the first question asking how many people in the household was quite confronting for some households and did not need to be asked to screen the household.

4.3 Screening, in-scope and interview rates

The screening, in-scope and interview rates for the recent arrival sample are provided in Table 2. These are discussed in more detail below.

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[14] The scope of only one household was amended when 101 households were re-contacted to validate the screening work.

Table 2: Household-level screening and response rates for recent arrival sample

	NSW	Vic	Total
Number of initial selections	692	521	1213
Less vacant dwellings, listing errors and other sample loss	42	38	80
Plus multiple household	1	0	1
Number of dwellings to be screened, excluding vacant dwellings and other sample loss	651	483	1134
Number screened	627	450	1077
(Per cent screened of those to be screened)	(96.3)	(93.2)	(95.0)
Number screened in-scope	29	27	56
(Per cent screened in-scope of those screened)	(4.6)	(6.0)	(5.2)
Number interviewed	25	17	42
(Per cent interviewed of those screened in-scope)	(86.2)	(63.0)	(75.0)

4.3.1 Screening and interview rates

We will focus first on the screening and interview rates, as these are more closely linked to the fieldwork procedures than is the in-scope rate. High rates of screening (of 95 per cent) were achieved. The screening rate in NSW was moderately higher than in Victoria. Overall, reasonably good interview rates were achieved from those identified as in-scope. Again, the NSW interviewers were more effective in gaining interviews than those in Victoria (86 per cent of those in-scope in NSW were interviewed compared to 63 per cent in Victoria).

The interviewers had difficulty combining the fieldwork for the continuing sample and the recent arrival sample. It is expected that this difficulty was borne out slightly differently in NSW and Victoria, as the continuing sample response rates were lower in NSW than in Victoria.

4.3.2 In-scope rate

The percentage of households identified with a person who was a recent arrival was 5.2, slightly lower (but not significantly so) than the expected rate of 6.6 per cent.[15]

To investigate whether we achieved high in-scope rates in areas expected to have a high number of immigrants based on the 2001 Census data, we have compared the achieved rate with an expected rate for the Collection Districts included in the Dress Rehearsal. The comparison was restricted to permanent arrivals and long-term overseas visitors as returning Australians who were away in 1997 can not be identified from the Census.

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[15] The confidence interval for the percentage of people screened in-scope, allowing for the clustering of the Dress Rehearsal sample into areas, is (3.6, 6.8).

In calculating the actual proportion of recent immigrants identified, we excluded households that are neighbours of continuing households that have moved since wave 1. We do not know the CD associated with these new addresses.

The expected proportion of recent immigrants is calculated as the proportion of immigrants in each CD who arrived in the 9-year period prior to the 2001 Census (i.e., between 1993 and 2001). That is:

$$P_{Arrived\,1993\,to\,2001,CD} = \frac{N_{Arrived\,1996\,to\,2001,CD} + 0.6 \times N_{Arrived\,1991\,to\,1995,CD}}{N_{CD}}$$

where $N_{Arrived\,XtoY,CD}$ is the number of immigrants in the CD who arrived between year X and year Y, and N_{CD} is the number of people in the CD. This person-level proportion is adjusted to a household-level proportion by multiplying by 1.19.[16]

The actual number of recent immigrants screened in-scope in each of the 47 CDs is shown in Graph 1 against the expected number.[17] The correlation between the expected and actual number of immigrants is positive, but low at 0.32.

In Graph 2, the 47 CDs are divided into quintiles based on their expected in-scope rate, and the expected and actual in-scope rates are displayed for each quintile along with the confidence interval for the actual in-scope rate. The striking feature of this graph is that the actual in-scope rate shows only a slight increase of 5.0 percentage points from the lowest to the highest rate (with the highest rate occurring in the second highest quintile). In contrast, the expected in-scope rate increases 14.2 percentage points from the lowest quintile to the highest. Indeed, the expected rate falls outside the confidence interval of the actual rate for the second lowest and the highest quintiles. This suggests that the Census data is a relatively weak predictor of where recent immigrants may be found, thus reducing the effectiveness of screening in high immigrant areas.

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[16] The household in-scope rate is calculated as $r_h = \left(N_p / N_h\right) \times \left(r_p / 2.1\right)$, where N_h and N_p are the number of households and number of people in the population, r_p is the person in-scope rate. The average number of persons per household is $N_p / N_h = 2.5$, and the number of immigrants living overseas in 1997 per household is 2.1.

[17] The expected number is calculated as the number of households actually screened in each CD multiplied by the expected proportion of recent immigrant households in that CD.

Graph 1: Expected versus actual number of immigrant households in-scope (excluding returning Australians) at CD level
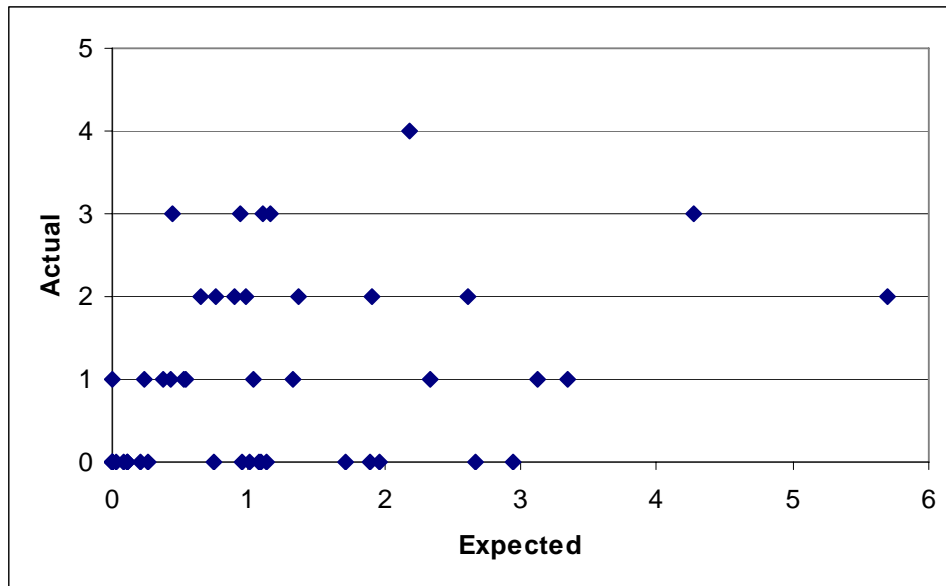
Graph 2: Expected and actual immigrant in-scope rates by quintile of expected rate (excludes returning Australians)
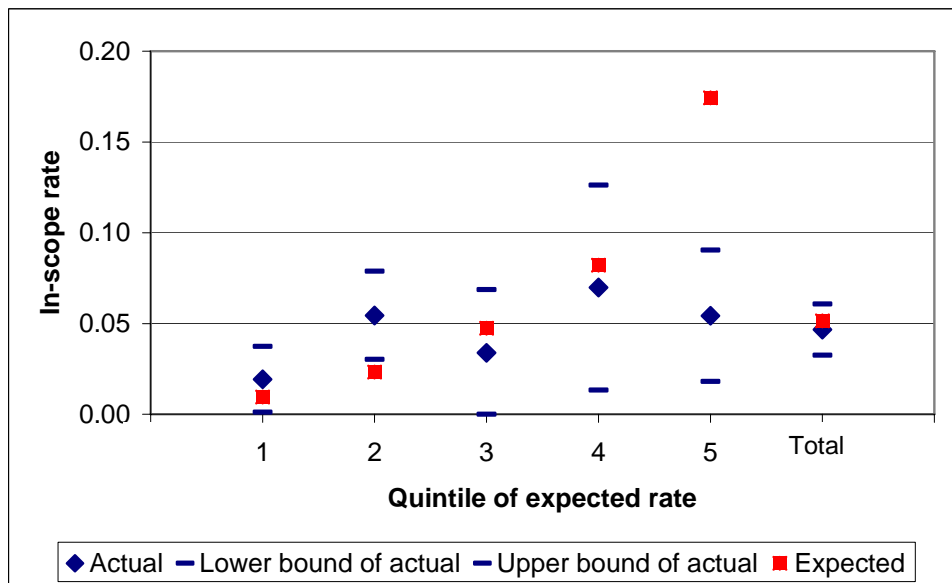
The discord between the expected and actual in-scope rates may have occurred for a number of reasons:

- Immigrants have a high mobility rate – The Census data is five years out of date, and in that time the immigrants that were once in the CD may have moved out into other areas not having a high rate of immigrants in the Census. While some weakening in the

relationship between the Census data and our screening results was expected, such a large shift away from the Census figures was not.

- Screening in high immigrant areas may be more prone to language difficulties or physical security barriers – Immigrants who choose to live in close proximity to other immigrants may have greater language difficulties when talking with the interviewer than those in other areas. Also, immigrants tend to live in flats and apartments with greater physical security barriers that would limit the interviewer's ability to make contact with the household. Nevertheless, high screening rates were achieved, with 94 per cent of households in areas with the highest expected immigrant rate were screened. Indeed, the lowest screening rates of 86 to 91 per cent occurred in Victoria in the two quintiles with the lowest expected immigrant rate.

- Long-term overseas visitors may not be screened correctly – Some long-term overseas visitors may only consider themselves as 'just visiting' and not be included in answers to the screening questions. Also, some clustering of long-term overseas visitors may occur (for example, students and people on working holidays) which may help explain the lower in-scope rates in the high density areas.

4.3.3   Types of households screened in-scope

A total of 42 recent arrival households were interviewed as part of the Wave 6 Dress Rehearsal test. The average household size of the recent arrival households was 3.4, compared to 2.5 in the main HILDA Survey sample. As shown in Table 3, there were on average 2.7 in-scope recent immigrants or returning Australians in the recent arrival households, with the remaining 0.7 people being in Australia in 1997.

One possibility for minimizing the bias in the continuing sample until a top-up occurs is to modify the following rules to make any recent arrivals who join sampled households permanent sample members. Of the 42 households interviewed in the Dress Rehearsal that contained recent arrivals, 36 percent formed part of the household with someone who was in Australia in 1997.

However, integrating these people with a top-up sample at some future date may require complex modeling to properly account for their joint selection probabilities.

Table 3: Households screened in-scope

Type	N	%	Ave HH size	Ave immig / ret Aust
Immigrants (and their children) only	23	54.8	3.4	3.4
Returning Australians (and their children) only	2	4.8	4.0	4.0
Immigrants and returning Australians (and their children) only	2	4.8	2.5	2.5
Immigrants (and their children) plus people in Australia in 1997	12	28.6	3.4	1.8
Returning Australians (and their children) plus people in Australia in 1997	3	7.1	3.7	2.3
Total	42	100.0	3.4	2.7

4.4 Fieldwork timetable

Whether a recent arrival sample or a general sample top-up is included, this fieldwork cannot occur at the same time as the fieldwork for the continuing sample, as the interviewers found it very difficult to combine these two very distinct tasks. An additional six weeks of fieldwork will need to be incorporated into the current schedule to permit the inclusion of the additional sample.[18] If a recent arrival top-up were pursued, then this additional fieldwork would only need to occur in the first wave the sample is introduced, as at later waves the recent arrival households can be incorporated within the existing workloads for the continuing sample. However, if a general top-up sample were pursued, then this additional fieldwork period would be a permanent addition to the schedule.

4.5 Cost and sample size implications for the main study

Following the Dress Rehearsal, a detailed comparison of the likely costs and expected sample sizes for the general top-up and the near neighbour recent arrival top-up was undertaken. The comparison is presented in Table 4.

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[18] Most likely, the fieldwork will begin 6 weeks earlier than normal in early July. To minimise the impact on the continuing sample response rates, the initial fieldwork for this group will be conducted before the fieldwork for the top-up sample.

Table 4: Comparison of recent arrival and general top-up sample options

	Recent Arrival Top-up	*General Top-Up*
Sample design	Double sample in 35% of metropolitan CDs with high density recent arrivals.	Systematic stratified random area-based sample, similar to that implemented in W1.
	Single sample in remaining 65% of metropolitan CDs and 75% of ex-metropolitan CDs.	
	No sample selected in 25% of ex-metropolitan CDs with extremely low density of recent arrivals.	
Number of households screened/approached	13,725	2,625
Sample loss, in-scope and response rates	6% dwelling loss (due to unoccupied dwellings, holiday homes, businesses, etc)	6% dwelling loss (due to unoccupied dwellings, holiday homes, businesses, etc)
	95% response to screener	70% response to interview
	8% in-scope in high density areas, 4% in-scope in low density areas	
	80% response to interview	
Number of households added to the sample	520 (1400 recent arrival people)	1,720 (90 recent arrival households and 240 recent arrival people)
Number of people per household	3.4 (2.7 recent arrivals or their children)	2.5
Indicative cost	Additional 18 per cent on top of funding to continue current sample for W10-12	Additional 18 per cent on top of funding to continue current sample for W10-12
Breakdown of cost over waves 10-12	W10: 84%	W10: 40%
	W11: 8%	W11: 30%
	W12: 8%	W12: 30%
Cost beyond wave 12	Additional 4 per cent each wave on top of funding to continue current sample	Additional 16 per cent each wave on top of funding to continue current sample
Expected relative size of the cross-sectional weight to current average weight in continuing HILDA Survey sample	0.5 times average weight in high density areas	0.8 times average weight for new non-recent arrival sample
	1 times average weight in low density areas	5 times average weight for recent arrival sample
	0.95 times average weight for continuing sample	0.8 times average weight for continuing sample
Main advantages	Explain the importance of the study face-to-face	Extra non-immigrant sample for more detailed analyses
	Build rapport with respondent	Helps counterbalance biases introduced to cross-section estimates over time
Main disadvantages	Screening cost is high	Ongoing costs after initial wave will be much higher
	Low screening rate (interviewers could become discouraged)	Coarser correction for the population undercoverage
	Cannot use interpreters easily	

The cost of the recent arrival top-up for waves 10 to 12 which ensures similar weights to the continuing sample was determined first. The sample size of the general top-up was then determined to match this cost over the same three waves. To allow for the cost of the top-up sample, the funding for waves 10 to 12 would need to be increased by 18 per cent beyond that needed to continue the current sample. This will provide for either a recent arrival sample of approximately 520 responding households, or a general sample of approximately 1,720 responding households (90 of which should be recent arrival households).

Beyond wave 12, the recent arrival top-up will have a much lower ongoing cost than the general top-up. An additional 4 per cent of funding would need to be set aside each wave to maintain the recent arrival top-up, whereas four times that amount would be required to continue the general top-up. This is a significant consideration for those funding the HILDA Survey as the general top-up requires a much larger commitment over the longer term. If we consider an 11-year window, the general top-up sample size would need to be reduced by around half to 870 households (45 of which would contain recent arrivals) to equal the cost of running a recent arrival top-up sample of 520 households between waves 10 and 20.

In terms of bias reduction, the aims of the two top-up samples are quite different. Including a recent arrival top-up sample will correct the population coverage bias of excluding recent arrivals over the nine-year window since the sample was selected in 2001 (this is in the order of 1.4 million people). The general top-up sample has broader aims and will seek to rectify not only this coverage bias of 1.4 million recent arrivals, but also aims to reduce (but will not eliminate) the sample attrition bias due to unobserved factors.[19] It is difficult to place an estimate on the size of the attrition bias or its reduction. The conventional belief is that non-response bias is likely to increase as a panel ages, but there is some evidence to suggest that the bias may not operate as we expect. In a study on the effect of non-response and attrition on income estimates from the European Community Household Panel (ECHP), Sisto (2003) found that the initial wave non-response was

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[19] Observed factors can be accounted for in the longitudinal weights and in the cross-sectional weights from wave 2 onwards. Unobserved factors cannot be adjusted for, but with a top-up sample that is less affected by attrition, estimates from the combined sample will also be less affected by attrition.

responsible for much of the bias in the estimates. She also found that there was no apparent trend towards larger bias due to attrition during the panel. Further, Rendtel (2005) found the surprising result in the ECHP that the bias due to non-response in the initial wave declines in subsequent waves. The extent of non-response bias in the HILDA sample needs further investigation, but we do know that a reasonably large proportion of people have attrited from the sample and they have observable differences from those who have stayed.[20]

Under the two top-up sample designs, different weights will result for the recent arrivals. If the top-up focuses solely on the recent arrivals, the cross-sectional weights for these individuals will be 0.5 to 1 times the weights of the continuing sample, depending on whether they are sampled in the high or low density immigrant areas. With a general top-up, recent arrivals will only be a small part of the top-up sample and will have cross-sectional weights around 5 times that of the continuing sample. The advantage of the general top-up is that the cross-sectional weight of all sample members, both new and continuing, who are not recent arrivals will have their weight reduced to 0.8 times that of the continuing sample prior to the top-up.

It is also possible to combine a recent arrival top-up with the general top-up, though there would be greater overheads in managing both top-up samples. The aim of this combined sample design would be to find the optimal mix to maximize the advantages of the two main approaches.

5. Conclusion

The HILDA Survey sample should be extended to include, at a minimum, permanent arrivals to Australia since 2001. The population under-coverage due to omitting this group from the sample grows each year and the characteristics of this omitted group are quite different from those included in the HILDA Survey sample. A large infrequent top-up should be adopted, repeating in approximately 10 to 15 year intervals (rather than a small annual top-up or a large top-up followed by a small annual top-up).

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[20] Of our wave 1 respondents, 74 per cent were re-interviewed in wave 5, 4 per cent had died or moved overseas, and the remaining 22 per cent were non-respondents. The factors associated with attrition include age (both the young and the elderly attrit more), non-English speaking background, low levels of education, and working full time in the previous wave (Watson and Wooden, 2006).

The two favoured options for a top-up to the HILDA Survey sample are either a recent arrival top-up identified by a near neighbour screening method or a general top-up from across the entire population. The cost of screening for recent arrival households is very high and needs to be weighed against the benefits of undertaking this exercise. These funds could be redirected towards a general top-up which has other long term benefits but will not provide a very large recent arrival sample.

There are characteristics common to both top-up options. The additional sample should be geographically clustered. The fieldwork should be conducted face-to-face rather than by telephone to achieve maximum response rates. For the same reason, translated materials and interpreters should be used.

If the recent arrival top-up is pursued, then a number of recommendations are made about the conduct of this top-up. The scope of the first top-up should be restricted to permanent arrivals, long-term overseas visitors and returning Australians since 2001. The scope of any subsequent recent arrival top-ups can be restricted to permanent arrivals and long-term overseas visitors. Rural and remote parts of Australia should be excluded (due to the small number of immigrants located in these regions). Around 13,000 households should be screened for recent arrivals. Consideration should be given to whether an additional sample is needed in waves 9-12. Waiting another five waves would increase the in-scope rate to around 8 per cent.

If a general top-up is pursued, then the sample size will be pragmatically determined by the available funding – the larger the sample, the better. The sample should be spread throughout Australia, excluding remote areas. Over-sampling in areas likely to contain recent immigrants will yield limited gains in the number of recent immigrants in the top-up sample.

Prior to any top-up being undertaken, the current following rules should be modified to incorporate recent arrivals as permanent sample members as they join continuing sample households. This will reduce the population under-coverage by an estimated 35 per cent.

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